here. But, as the authors state, omissions must be made. The print and illustrations are such as to add to the attractiveness of the book. The book is certainly one of the best of our high-school textbooks in physics.

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Introduction to General Inorganic Chemistry. By ALEXANDER SMITH. New York: The Century Co., 1906. Pp. xviii + 780.

This book is intended for use in a college or university. The subject is treated in a masterly manner, and the subject-matter up to date. The method of treatment shows that it has been written by a teacher who understands the psychology of teaching. It cannot be said, however, to be an "easy book." The author admits in the preface that it contains some "stiff" reading. The beginner in chemistry will need much laboratory work, and considerable explanation from his teacher in conjunction with the text. The book will be particularly useful to the student who has had a previous elementary course in general chemistry. The hypothesis of ions underlies the whole treatment. Theory receives the principal consideration, and great detail in explanations is a feature of the work.

The first four chapters are introductory, and deal for the most part with the various general characteristics of chemical phenomena, the fourth chapter being confined to symbols, formulæ, and equations. Chapters five to thirty-one inclusive deal with the non-metallic elements, together with chapters on the gas laws, the kinetic-molecular hypothesis, solution, molecular and atomic weights, the atomic hypothesis, chemical equilibrium, dissociation in solution, electrolysis, and the chemical behavior of ionic substances. The last fifteen chapters deal with the metallic elements, together with part of a chapter on chemical equilibrium considered quantitatively, and one chapter on electromotive chemistry.

The book is doubtless the very best of its kind and will be found to be particularly strong on explanations in connection with the hypothesis of ions. This, of course, includes much of the book. It is not intended as a reference book. As a textbook of general inorganic chemistry the reviewer knows of no other in which the theory is so thoroughly treated. Several valuable tables are to be found in the book such as those on solubility of compounds; degree of ionization of acids, bases, and salts, and the electromotive series of the metals.

A few minor points that should be corrected in a future edition have attracted the notice of the reviewer as follows: on p. 50 the words "by weight" should doubtless be added to the definition of "equivalent weight." On p. 69 formulæ are derived from the calculated proportional number of atoms in the molecule, the vapor density not being considered, whereas on the next page in the case of phosphoric anhydride the vapor density is taken note of. To the thoughtful beginner the question of the vapor density of sulphur dioxide, p. 69, would probably arise. On p. 72 the definition of "reduction" is not satisfactory for a final definition. On p. 351 the equation in the paragraph on neutralization is not balanced. It seems to the reviewer that more use might have been made of the hypothesis of ions in helping the student to learn to write equations. The writing of equations is a source of trouble to practically all students of chemistry. In cases of double decomposition, especially, if the student is taught to divide the formulæ on the left-hand side of the equation so as to indicate the ions, with their proper signs, and then to indicate

on the right-hand side of the equation the combination of positive and negative ions into pairs, taking proper precaution as to valence he will find it a great relief in the work of making equations.

The book as a whole is a splendid production, and although it may never be found to be adaptable to high-school classes on account of its advanced nature and its university-lecture style, it will be invaluable to the high-school teacher who wishes to be up to date on theory and hence in a position to make his instruction of a fresh and vigorous nature, and there is no reason why it should not be the standard general textbook on inorganic chemistry for college and university classes.

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Practical Mathematics. By A. G. CRACKNELL. 3d ed., Longmans, Green & Co., 1904. Pp. viii+378.

This volume is one of many recently issued in this and other countries in the common attempt to bring more practically within the comprehension of students the usefulness of mathematical studies. This attempt is finding expression in all grades of work from the most elementary to the highest college and university courses. The so-called Perry movement in England, being originally an effort on the part of Professor Perry and others to make the training of engineers less theoretical and more practical, has influenced all phases of mathematical teaching in that and other countries. An equally significant movement is taking place in Germany led by Klein and other university professors.

The volume under consideration includes topics in arithmetic, such as fractions, short methods of multiplication and division, powers, roots, etc.; in algebra, such as the elementary operations, factors, fractions, equations, radicals, logarithms, etc.; in geometry, such as areas, volumes, graphical area, areas by squared paper, proportion, etc.; and in trigonometry and plane and solid analytic geometry. Many principles of the calculus are also included by means of illustrations and exercises, but no formal presentation of the calculus is given. Indeed there are no proofs of any kind given in the book and no development of theory—only statements of facts and foundations of rules, together with sample solutions, and an abundance of exercises for practice in following out the rules. In the author's words: "The object of the book is to develop in the student a clear and accurate conception of the more useful principles of elementary mathematics. For this purpose it is certainly not necessary that the student should master the complex scheme of rigid argument from which these principles are ultimately deduced; for example, the sixth book of Euclid is in no way essential to an accurate practical knowledge of the properties of similar figures." Otherwise stated, the time and energy usually given to demonstration of principles and development of theoretical knowledge is here devoted to the numerical, mechanical, and graphical interpretation and verification of given statements. Much emphasis is given to numerical computation, especially with logarithms, to the use of the slide rule, the diagonal scale, the protractor, the dividers, the planimeter, and every device usable in an elementary and practical manner to see and get results. Special stress is laid upon the interpretations of observations and the translation of data into formulæ by numerical and graphical methods, and all processes are abundantly illustrated by examples fully worked over and explained in the text and followed by numer-